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## Applied Ecology used against a Fly Pest Problem in Australia

Australian research entomologists are rebuilding an ecological chain in an attempt to overcome a fly-pest problem. Their aim is to introduce from abroad dung beetles which, in spite of their small size, are extremely efficient in getting rid of cattle dung where the bushfly (*Musca vetustissima*) and the buffalo fly of the north (*Haematobia exigua*) breed.

In most parts of the world the dung beetle to disperse the cattle dung is a native species, but not in Australia, for the local dung beetles have developed specialised characteristics. They work well in the hard round dung of Australian marsupials, but show little interest in the soft cattle dung because cattle are not Australian natives. The cattle imported from Asia brought the buffalo fly with them, and on the other hand, cattle brought from Europe left that pest's enemy at home. It will be seen that the buffalo fly is a misfit and does not legitimately belong to Australia.

As a result, cattle dung has been lying virtually undisturbed all over Australia, covering an estimated total area of 3,000,000 acres, with the serious disadvantages this can bring. The major effect has been the prevalence of the buffalo fly in northern Australia, where it has created a serious economic hazard for the cattle industry; the blood-sucking fly irritates the beasts to a point where they cannot eat, thus seriously affecting the

production of meat. Pesticides have been of little use for although they kill the fly, they leave a residue in the meat which is not acceptable to overseas markets. Many cattle owners also have difficulty in mustering their stock often enough for treatment.

The situation was put before the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Dr. G. F. Bornemissza of its Division of Entomology took up the study. Dr. Bornemissza, who has been studying dung beetles for some fifteen years, went to Fiji and Hawaii to assess how useful they could be for Australia.

Eight promising species, *Onthophagus gazella*, *Liatongus militaris*, *Copris incertus*, *Hister caffer*, *H. chinensis*, *H. nomas* from Africa and *Canthon humectus* from Hawaii, were introduced into the CSIRO laboratories in Canberra from elaborate breeding tests in quarantine, special precautions being taken to ensure that no unwanted pests or germs could slip under the country's strict quarantine guard. This took time, of course, and none of the beetles was able to leave the quarantine area for two years.

In 1967 the first beetles went into the field and within four years, over 300,000 of them from seven different species had been distributed in a wide belt across northern Australia, they bred well, and one species, *O. gazella*, established itself in an area 250 miles long and 50 miles deep, extending at the rate of 25 miles in all directions each year. It has become so numerous that cattle pads are disappearing in one or two days, giving a fair degree of control of the buffalo fly.

There are also other benefits: because the beetle works quickly, the dung is buried in the soil before it begins to break down and lose its nitrogen, and it thus becomes a very effective fertiliser. Further, by removing the cattle pads, the beetles are opening up more pasture land. If the pad simply remains on the ground, the grass beneath is lost, and the surrounding grass becomes rank and unattractive to cattle.

Continued research is going on to provide the best possible coverage of the buffalo fly breeding areas by the introduction of other dung beetle species to ensure, where possible, that all soil and climatic conditions have a suitable beetle. This research is locating new species to suit specific climatic, soil and vegetable types, and thus give an even greater coverage.

Following the success of the buffalo fly campaign, the CSIRO has now turned to the bushfly, which poses a significant economic problem to the tourist industry as well as a nuisance problem to residents. Shortly it will release dung beetles suited to a temperate climate in the south-coast area of New South Wales.

Collecting the various species has been a long and complex task; to help achieve the aim of getting a suitable dung beetle for each of Australia's wide range of climatic and vegetational regions, Dr. Bornemissza has been operating from a special research station in Africa. From this station he hopes to select

and transport some 120 species of dung beetles from many parts of Africa south of the Sahara. He describes this project as "probably unique in the history of applied ecology." (AIS).

\* \* \*

I am indebted for this article to The Australian News and Information Bureau, which went to some trouble on my account to comply with my request for the names of the beetle species and also of the flies concerned.—Ed.

## A variety of *Syrphus albostriatus* Fallén (Diptera: Syrphidae)

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Coe (1953) states this species has tergites 3 and 4 with a pair of straight yellow bars, almost or quite touching the anterior margin of the tergites on the median line, where they are usually narrowly connected, and sloping down towards the side-margins. He also states that in some examples the yellow markings of the tergites are reduced.

I have now examined several specimens of this insect, and have come to the conclusion that there is a definite case for the naming of a separate variety, since the differences between the two apparent forms are much greater than suggested by Coe.

The normal form, which agrees with Coe's description, has the following characteristics:—

- (1) Legs entirely yellow/orange except for the distal tarsi on the hind legs, and a dark band on the centre of the hind femora of the male.
- (2) Scutellum yellow, with only faint dark markings.
- (3) Eyes with short hairs.
- (4) Thorax with distinct yellow side-markings at front.
- (5) Yellow markings on tergites 3 and 4 touching at the centre for a distance equal at least to half the depth of the yellow markings, and touching the base of the tergites on the median line.

The variety has the following characteristics:—

- (1) All femora and tarsi black, and the centre of the hind tibia is also black.
- (2) Scutellum with a distinct dark centre.
- (3) Eyes distinctly hairy.
- (4) Thorax with very faint or no side-markings.
- (5) Yellow markings on tergites 3 and 4 not connected at middle, and not touching base of tergites on median line.

The above description apply equally to males and females of both form.

I have records of the normal form from the Bristol area and various parts of Dorset, and of the variety from South and East Dorset.

This does not appear to be a melanic, as melanics of various *Syrphus* species occur, and these are invariably entirely black.